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Tracing the History of the Taruma People through Plants, Their Names, and Uses

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Abstract

This article explores what plants, their names and uses can tell us about the history of the speakers of Taruma, a language isolate of Guyana. We identified Taruma plant taxa from photographs taken by Taruma speakers and learners, and compared the names and uses of the plants they recorded to those of other Indigenous people to identify knowledge that Taruma speakers share with other nations. Our outcomes show the potential of combining botany and linguistics to shed light on the past and serve as a proof-of-concept of the remote method for documenting plant knowledge. We offer linguistic evidence of a Taruma migration and discuss the unusually high rate of loans in Taruma, considering factors such as the strategic location of the Taruma homeland on the Amazon, the subsequent migration into a new linguistic landscape in Guyana, and a past hunter-gather mode of interactions with the environment.

Keywords

Taruma – borrowing rate – migration – botany – hunter-gatherer – trade

1 Introduction

Of the estimated 7097 languages spoken in the world, between 34% and 90% are threatened by extinction (Belew and Simpson, 2018). The rate at which languages vanish is accelerating: of the languages known to have died out in human history, some 30% have disappeared in the last 60 years (Campbell and Okura, 2018). The languages most threatened by extinction are often those spoken by marginalized societies, whose knowledge is poorly documented, described, and represented in media, education, and society at large. The accelerating extinction rate implies also the loss of knowledge embedded in them, including the oral histories of their speakers and knowledge about plants (Aswani et al., 2018; Cámara-Leret and Bascompte, 2021). In this paper, we analyze therefore three aspects of knowledge about plants – the plants, their names, and their uses – through the prism of language contact to shed light on the history of the Taruma people, an Indigenous nation of Guyana.

Taruma is a critically endangered language; to our best knowledge only three people identify as Taruma speakers today. This calls for three responses: vitalization, documentation, and description. We report on a project embracing these goals carried out by the speakers of Taruma, their relatives and friends speaking Wapichan (an Arawakan language), as well as linguists and botanists from the Netherlands. Due to the COVID-19 pandemic, most of the research was carried out remotely following the method described in Holt et al. (2023). This study serves as a proof-of-concept of this remote method for documenting plants. In broad strokes, the Taruma and Wapichan speakers, henceforth the on-site team, identified Taruma plants, used a smartphone to photograph them and record their names and uses. To stimulate the transmission of knowledge, the speakers and learners of Taruma worked together, thereby learning from one another about the features, names, and uses of the plants. The on-site team sent the data via the WhatsApp application to the team abroad, henceforth the off-site team, who established the botanical identifications of the plants, created an audiovisual corpus of Taruma plant knowledge, and analyzed the data. Since Taruma is a language isolate, the words that it shares with other languages speak to past interactions with other nations. To shed light on such interactions and tell the history of the Taruma people, we analyzed the plant names against their linguistic features (etymology), those of their referents (e.g., uses), the

borrowing patterns in South American languages, and evidence from archaeology, history, and social memory.

Despite the difficulties with identifying plants remotely and untangling the etymologies of their names, the outcomes show the potential of combining evidence from several domains to cast light on the past. Such approaches may be particularly useful in the case of language isolates, whose past stages, and by extension the past realities of their speakers, cannot be reconstructed using the comparative method of historical linguistics (e.g., Weiss, 2016). We offer the first linguistic evidence of Taruma migration, so far based on converging, but limited, evidence from history, archaeology, and social memory, and interpret the unusually high rate of loans in Taruma, considering factors such as the strategic location of the Taruma homeland, the later migration into a new linguistic and botanical landscape, and changes in the mode of interaction with the environment.

1.1 *Linguistic and Botanical Landscape of the Region*

Guyana is a multicultural country. The majority of Guyana's population lives along the coast and descend from people brought here from other parts of the world, most of whom are the descendants of enslaved Africans and indentured workers from India. The official language of Guyana is English, while Guyanese Creole English serves as a *lingua franca*, especially on the coast (Forte, 2000). Indigenous people live mostly in the interior and make up about 11% of the population. Nine Indigenous languages are recognized in the country (Ministry of Amerindian Affairs, 2023). Six belong to the Cariban language family: Akawaio, Kari'na, Macushi, Patamona, Pemón, Waiwai; two to the Arawakan language family: Lokono, Wapichan; while Warao is a language isolate (Forte, 2000). Taruma, a language isolate, as well as Atorad and Mawayana, two Arawakan languages, are still spoken in Guyana as well, but have so few speakers that they have been presumed extinct. Few people in Guyana have ever heard about them. The speakers of Taruma live in *Toronaawa*, a part of the Wapichan village *Maroranaawa* in *Wapichan Wüzi*, the 'Wapichan Country', in the Upper Takutu-Upper Essequibo region (Fig. 1). Wapichan is the local *lingua franca*. The region is the largest and least populated region of the country; its inhabitants depend mostly on agriculture, hunting, and cattle raising (Henfrey, 2002).

Guyana is also a biodiversity hotspot: 85% of the country is covered by mostly undisturbed rainforest (ter Steege, 2000). The floristic diversity is high: 7112 vascular plant species from some 1700 genera and 200 families have been collected, and more species will likely be recorded with increased collecting efforts (Funk et al., 2007; Haripersaud et al., 2010). *Toronaawa* is situated on

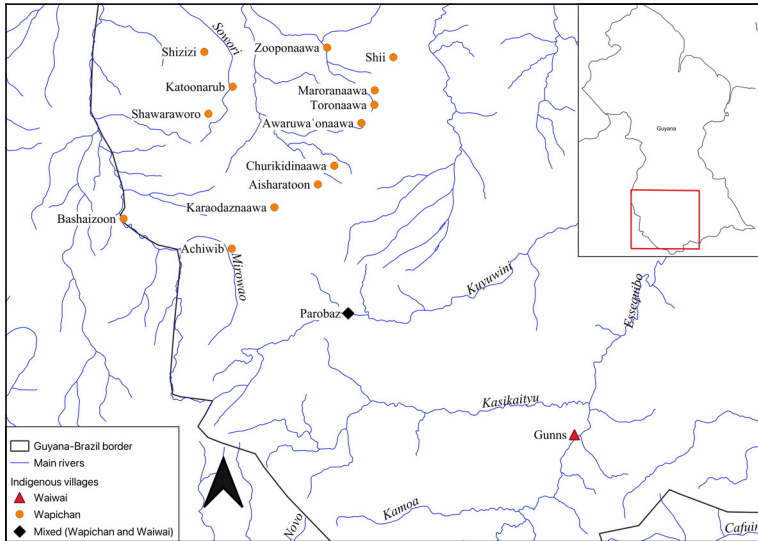


FIGURE 1 Location of Toronaawa and the main Wapichan and Waiwai villages
CREATED WITH QGIS

the edge of the interior rainforest and the Rupununi savanna, the largest non-forested area in the country. The savanna, an extension of the Rio Branco savanna of Brazil, differs from the rest of Guyana. Its tropical climate has only one wet season (May–August); its flora includes plants that are more drought and fire resistant (Jansen-Jacobs and ter Steege, 2000). In sum, Guyana is home to several Indigenous nations whose languages are threatened and has a high floristic diversity that has not been studied thoroughly. Local organizations such as the South Rupununi Conservation Society and the Wapichan Literacy Association are actively working to preserve local languages, culture, and nature.

1.2 *Taruma People, Their Language, and History*

Taruma is an exonym, a name given to the people by outsiders; the speakers call themselves *Hojasu* (see Appendix 1 in the Supplementary Materials for an orthography). We use *Taruma*, since it is better known in the literature, and it is also used by the speakers. The Taruma speakers, siblings Vincent and Irene, live among the Wapichan people. Irene is fluent in Taruma, Vincent less so. Both of them also speak Wapichan. It is possible that there are other speakers in other villages who have not been identified yet. The literature on the Taruma people is limited to travel logs of Robert Schomburgk (1843; 1845) and his brother Richard (Roth, 1922), Cary-Elwes' manuscripts (Butt Colson and Morton, 1982), and accounts by Farabee (1918), Ogilvie (1913; 1940), and Roth (1924). Prior to

this research, the only sizable, published language data was Farabee's 200-item wordlist, studied by Loukotka (1949), who, like us, set out to identify borrowings in Taruma. Jolkesky's (2016) mass comparison of Amazonian languages includes several Taruma words. Bar a few names of plants (Yde, 1965: 70–93), little is known about Taruma plant knowledge.

Little is also known about Taruma history. The first mention of Taruma people comes from 1657, but not from Guyana (Rivière, 1966). The name was recorded by the Portuguese at the mouth of the Negro River, near modern day Manaus, Brazil, where the Nossa Senhora da Conccicao mission was set up (Fig. 2). In subsequent decades, the "Brazilian" Taruma moved up the river to Ayrão, and dwindled in numbers due to Portuguese slave raids. By 1770, they disappeared. But in 1725, a nation called Taruma was reported by the Dutch on the Upper Mapuera River, and in 1764 on the Upper Essequibo River in what is now Guyana. This led to the belief that the Taruma people migrated from the Negro River to the Essequibo. By the 20th century, the "Guyanese" Taruma ceased to exist as a distinct nation due to epidemics and interethnic conflicts; today, the last speakers of Taruma live among the Wapichan people.

Rivière (1967) questioned the above migration scenario (from Manaus to the Essequibo), since exonyms can refer to various, even unrelated, nations. The Saluma people, for example, have been deemed a cohort of the Guyanese Taruma who lived in Suriname, but Carlin's (2004: 8) analysis of Saluma wordlist showed they spoke Trio, a Cariban language. Similarly, Frikel (1957: 544) listed Charuma, another reflex of the name used by the Trio people to refer to a "friendly" nation of the Trombetas basin, and later to all the people of that region, including speakers of Cariban languages. Further, although Farabee (1918: 135) reported that, according to early 20th century Taruma people, their ancestors had come from the south, since Brazilian Taruma was not documented, it cannot be compared with the Taruma spoken in Guyana to verify that they are one language, and by extension one people. The speakers of Taruma today are not familiar with the oral history of migration either. The alternative hypothesis is that the Taruma people are native to Guyana and their relationship to the Brazilian Taruma is limited to a similar name. Rivière (1967: 310) ended his argument stating that "if an answer is to be found, archaeology must provide it". He believed so because he thought that Taruma had gone extinct. And while archaeological evidence did come forward a decade later, albeit in an anecdotal fashion (Boomert, 1977), we explored another window into the past: the borrowing patterns in the names and uses of plants known to the Taruma speakers.

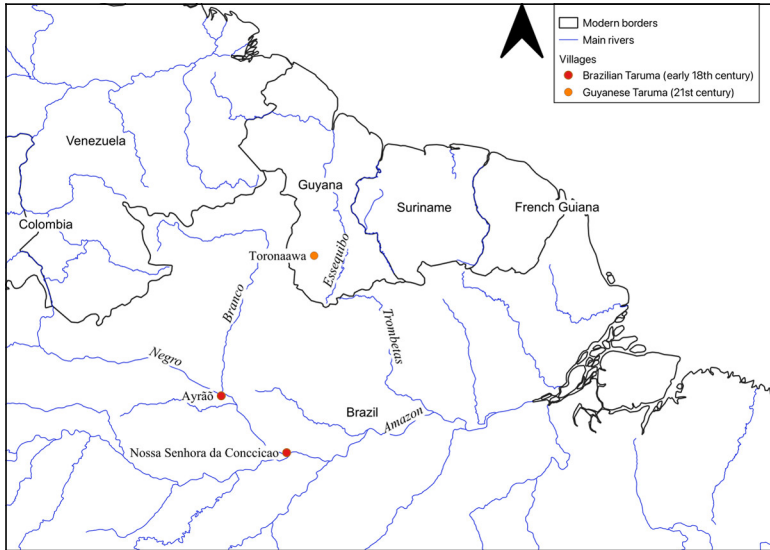


FIGURE 2 Location of the Brazilian and Guyanese Taruma
CREATED WITH QGIS

2 Methods

Most of the research was conducted remotely in 2020 (see Holt et al., 2023). In 2021, however, the off-site linguists traveled to Toronaawa to advance on the linguistic analysis, and in 2022, one of the off-site botanists joined the fieldwork to improve the botanical identification. The Indigenous and foreign researchers were all actively involved in the research. To make sure that sensitive knowledge is not shared with the outside world, the speakers were in charge of what they photographed, did not document medicinal recipes, and approved the final version of the article. We discuss our workflow using the first names of the present authors, as is common in Maroranaawa.

2.1 Remote Documentation of Plants

Adrian, the local coordinator, bought a smartphone, so that Vincent, a Taruma speaker, could go out to identify and photograph plants using his criteria (as evidenced in the photographs of bark cuts, for example), assisted by Nita and Elizabeth, the Taruma learners. Irene, the second Taruma speaker, working with Elizabeth, identified the plants independently from the photographs. The team started with cultivated plants, which were expected to be easier to identify for the off-site team, but were in principle free to document whichever plants they wanted. For each plant, they photographed the entire plant, with a person or

hand for scale, its stem, leaves, flowers, and other features that could aid the off-site team in identifying the plant. They used voice messages to record the plant names, each repeated three times by a speaker and a learner to assure that the off-site team could hear them clearly and to stimulate the transmission of the language among the on-site team. The team also recorded the Wapichan and English plant names. Plant uses were recorded in the same trilingual format. At times, the on-site team also included photographs of plant-based products.

2.2 *Processing the Audiovisual Documentation*

Nita, Elizabeth, and Konaukii, Wapichan speakers, organized the photographs and recordings per plant, effectively preparing the *photo vouchers*, and sent the compiled material to the off-site team (e.g., Gómez-Bellver et al., 2020). Robin and Anne Marie, ethnobotany students, downloaded the data using the desktop version of WhatsApp, and created *audiovisual vouchers*, that is, photo vouchers with embedded audio, one of the products for the learners and their community (Fig. 3). Once the vouchers were ready, the on-site team confirmed that the photographs were associated with the right names by the off-site team.

Since, several voice messages were recorded about each plant. To efficiently work with the data, Robin concatenated them into longer files. Anna and Konrad transcribed the files in ELAN, a software for annotating recordings. Anna, a linguistics student, transcribed the Taruma and Wapichan, and developed an orthographic standard for Taruma with the on-site team. Robin and Anne Marie transcribed the English data. Konrad, the project leader, created videos for the community including the audio files with time-aligned photographs of the plants, their names, and their botanical identification.

2.3 *Complimentary Fieldwork and Species Identification*

In 2022, Robin collected additional data on site. He worked with Vincent and Irene, as well as with a speaker of Waiwai and Trio, Rabeck Shushu, speakers of Macushi and Wapichan, Assis Joel and Daniel Joseph, and a Wapichan speaker, Lawrence David, to document the names of the same plants in other languages. He also took a trip with Vincent, Lawrence, and Rabeck to the forest where Irene and Vincent's family used to live to record their family memories and additional plant names.

To identify the plants, Robin and Tinde, an ethnobotanist, consulted experts on Neotropical flora, the PlantNet and iNaturalist applications that recognize plants from photographs, floristic literature, and the online databases of the Global Biodiversity Information Facility and the Naturalis Biodiversity Centre (e.g., Alonso et al., 2016; van Andel, 2000; Cummings, 2013; Henfrey, 2002). To determine whether any of the plants are endemic to Guyana, the identi-



FIGURE 3 Example of a voucher, *kwakipa* (*Duguetia* sp.), with Vincent in the picture

fied plants were categorized by their distribution using the Global Biodiversity Information Facility (2021). We furthermore classified each plant as either a cultivated crop, a low-maintenance domesticate or as wild. This classification is Taruma-centric, and based on how the plants are managed by the Taruma.

2.4 Linguistic Sampling and Comparison of Plant Names

Robin and Konrad compared Taruma plant names, including those recorded by Farabee (1918) and Cary-Elwes (1922), to those in other languages, as well as names of species within the same genus or with similar uses (Appendix 2, 3 in the Supplementary Materials). For a detailed comparison, we selected the better-described languages from three language families that represent the linguistic diversity of the Negro River and Guyana: Nheengatu (Tupian), Bahuana, Wapichan (Arawakan), Macushi, Trio, Waiwai, Waimiri-Atroari (Cariban). We also compared the data to the scant data from the moribund and extinct languages neighboring Taruma on the Negro River and in Guyana: Manao, Arauakí, Atorad, Mawayana (Arawakan), and Omagua (Tupian). Several other languages were consulted on an *ad hoc* basis to identify words of Arawakan, Tupian, and Cariban origin.

In linguistic diversity hotspots such as Guyana, it is difficult to determine the source of a borrowing. We can, however, establish the most parsimonious scenario: the closest language with the most similar name as those requires fewer assumptions about population movements and language change. If a word is

shared with one language or unrelated languages, we classified it as *shared*, as the direction of borrowing is unclear. If it is shared with several related languages, we classified it as a *cognate candidate*, a word likely inherited from a common ancestor language in those languages, and thus a *borrowing* into Taruma. Complex words (e.g., *blueberry* in English) whose meaning is transparent in a language other than Taruma were classified as originating in that language, and therefore also borrowings into Taruma. Words that are not shared with other languages were classified as *unique*.

We classified the shared names into *simplex* words such as *mapaya* ‘papaya’ and *complex* phrases translated word for word such as *badu chinari*, which means ‘ax handle’, and mimics Wapichan *baro taba’u* with the same meaning. In contrast to simplex loans, the introduction of phrases, also known as calques, requires a degree of bilingualism on the part of the speakers, and their source cannot be determined by identifying cognate candidates, since in this case it is meaning that is copied. We also distinguished words borrowed by up to three languages, here called *local loans*, from words borrowed by at least four languages, so-called *Wanderwörter* (Haynie et al., 2014). We operationalized the distinction in terms of language families, since words in related languages can be cognates.

Our aim was to identify the exchange events that took place on the Amazon and the Negro Rivers before the 18th century, on the Essequibo River between the 18th and the 20th century, and in Guyana since the 20th century. Only a few exchanges could be located in time and space. The main reason is that the names of the recorded plants are often not documented in other languages. When not all forms are known in the Guyanese subsample, for example, we cannot exclude the possibility that Taruma exchanged the name with a Guyanese language. We located exchange events in time and space only when the name is documented in all, or all but one, languages in the relevant subsample including the scant historical material.

Finally, we calculated the loan rate in Taruma. In doing so, we tried to keep the loan rate as conservative as possible. We excluded words that could have been borrowed from Taruma into other languages (e.g., calques), and recent loans from official languages (e.g., English), since these may reflect a different type of language dynamics (though in several cases we excluded the possibility that the loans are recent results of language loss). While we discussed several plant names recorded in historical sources, we focused on the current (or synchronic) state of the language by including only modern names in the rate. We prioritized unique names over others where variants existed. The few plant-based products discussed below are not counted towards the loan rate either to limit the domain to plants proper.

3 Results

A total of 60 Taruma plant vouchers were analyzed (Table 1), of which 54 species were recorded remotely and six during the first field visit (27 species documented during the second visit were not included). The total number of species is at least 63, since three Taruma vouchers represented two different species. Several other Taruma names, marked as *spp.*, refer to more than one species, but these were not identified. 78% of the Taruma plants were identified to species level, 18% to genus level; one plant was identified to the family level only and one plant remained unidentified. Two landraces of cotton and cassava were recorded. A species of *Duquetia* may be new to science according to Paul Maas, an expert on this family (Naturalis Herbarium, Fig. 4). The plants represent 28 botanical families.

The vouchers included four crop species introduced during the transatlantic slave trade, water yam (*Dioscorea alata*), sorrel (*Hibiscus sabdariffa*), banana (*Musa* sp.), and sugar cane (*Saccharum officinarum*) (Carney, 2013). Of the 60 Taruma plants, 22% are domesticated crops, 22% require low-maintenance cultivation (mostly fruit trees), and 56% are wild species. Since the documentation was led by Taruma speakers, it reflects their engagements with the landscape, and while the documentation of the uses was rather laconic, it likely reflects the primary uses of the plants. 20 Taruma plants are used as food only, 17 as materials, and 8 as medicine. The remaining plants have two or three types of uses.

For four species, the speakers offered two names, and five names from historical sources are different from those used today. As we shall see, these names can be best analyzed as pairs of a new and an old name that already went out of use or is going out of use. The two names for papaya (*mapaya*, *papa*) and tobacco (*tuma*, *soma*) are treated as different borrowing events of the same root; those for pumpkin (*yama*, *auyama*) as a language internal change. The total number of names is 66, but only 58 count towards the loan rate, since *makashira* ‘sweet cassava’ and *sariri* ‘hibiscus’ are recent loans from official languages, and historic forms and synonyms are excluded. Of these 58 names, the majority are simplex and about a quarter are complex (Table 2).

TABLE 1 Plant names, their botanical classification, and uses

Scientific name	Taruma name	Guyanese English name	Uses
Taruma plants with unique names			
Bromeliaceae sp.	<i>nakipa</i>		C: MT
<i>Anacardium giganteum</i> Hancock ex Engl.	<i>makwe</i>	wild cashew	W: FO
<i>Anacardium occidentale</i> L.	<i>makika</i>	cashew	L: FO MD
<i>Astrocaryum</i> sp.	<i>kirafu</i>		W: AF MT
<i>Attalea maripa</i> (Aubl.) Mart.	<i>chada</i>	kokerite	L: FO MT
<i>Bertholletia excelsa</i> Bonpl.	<i>mêhe</i>	Brazil nut	W: FO
<i>Bixa orellana</i> L.	<i>horia</i>	achiote	L: MT
<i>Byrsonima coccolobifolia</i> Kunth	<i>pichiwi</i>		W: FO
<i>Capsicum annuum</i> L.	<i>nado</i>	pepper	L: FO
<i>Curatella americana</i> L.	<i>birijanako</i>	sandpaper tree	W: MD MT
<i>Gynerium sagittatum</i> (Aubl.) P.Beauv.	<i>koba</i>	arrowstick	W: MT
<i>Gossypium hirsutum</i> L.	<i>suja, molu</i> (†)	cotton	L: MT
<i>Inga</i> spp.	<i>shirika</i>	whitey	W/L: FO
<i>Ischnosiphon arouma</i> (Aubl.) Körn	<i>dakika</i>	mokru	W: MT
<i>Manilkara bidentata</i> (A.DC.) A.Chev	<i>bikiro</i>	balata	W: FO, MT
<i>Manihot esculenta</i> Crantz ‘Bitter’	<i>nito</i>	cassava	C: FO
<i>Musa</i> spp.	<i>piroka</i>	banana	C: FO
<i>Oenocarpus bataua</i> Mart.	<i>hoga</i>	turu	W: FO
<i>Oenocarpus bacaba</i> Mart.	<i>chamani</i>	patawa	W: FO MT
<i>Phenakospermum guyannense</i> (A.Rich.) Endl. Ex Miq.	<i>peritono, piroka</i> <i>joka</i> (≈)		W: MT
<i>Protium</i> sp. 1	<i>zu’i</i>	kurokai	W: MD MT SU
<i>Renealmia</i> sp.	<i>fofokani</i>		W: MD
<i>Saccharum officinarum</i> L. *	<i>jitoka</i>	sugar cane	C: FO
<i>Thoracocarpus bissectus</i> (Vell.)	<i>chokapa, supijo</i> (≈)	scraping nibi	W: MT
<i>Xanthosoma sagittifolia</i> (L.) Schott,	<i>korona</i>	tannia	C: FO
<i>Colocasia esculenta</i> (L.) Schott		eddoe, dasheen	
<i>Zea mays</i> L.	<i>choka</i>	corn / maize	C: FO
Unidentified tree	<i>kiyaku, jasu asuk-ijo</i> (≈)		W: MD

TABLE 1 Plant names, their botanical classification, and uses (*cont.*)

Scientific name	Taruma name	Guyanese English name	Uses
Taruma plants with shared and borrowed names			
<i>Adiantum argutum</i> Splitg.	<i>hohoki adu</i>		W: MT
<i>Ananas comosus</i> (L.) Merr.	<i>kobara</i>	pineapple	C: FO
<i>Aspidosperma</i> sp.	<i>badu chinari</i>	yarula	W: MT
<i>Astrocaryum aculeatum</i> G.Mey.	<i>ta(ka)</i>	acquero	L: FO MT
<i>Byrsonima verbascifolia</i> (L.) DC.	<i>hichi asukijo</i>		W: FO
<i>Carica papaya</i> L.	<i>papa, mapaya</i> (≈)	pawpaw / papaya	L: FO
<i>Casearia bicolor</i> Urb.	<i>choka kana</i>		W: MT
<i>Costus spiralis</i> (Jacq.) Roscoe	<i>hakori jiro</i>	congo cane	W: MD
<i>Couratari guianensis</i> Aubl.	<i>soma o, watare</i> (†)		W: MT
<i>Crescentia cujete</i> L.	<i>koya</i>	calabash tree	L: MT
<i>Cucurbita</i> sp.	<i>yama, auyama</i> (†)		C: FO
<i>Dioscorea alata</i> L.*	<i>pirisha</i>	water yam	C: FO
<i>Dioscorea trifida</i> L.f.	<i>karowa</i>	bell yam	C: FO
<i>Duguetia</i> sp.	<i>kwakipa</i>		W: MT
<i>Euterpe oleracea</i> Mart., <i>Euterpe precatoria</i> Mart.	<i>wabo</i>	manicole	W: FO MT
<i>Goepertia</i> sp.	<i>charaba ada</i>		W: MD
<i>Gossypium hirsutum</i> L.	<i>suja, molu</i>	cotton	C: MT
<i>Gossypium hirsutum</i> L. 'Brown'	<i>mo i</i>	cotton	L: MT
<i>Heteropsis flexuosa</i> (Kunth) G.S.Bunting	<i>bīwa</i>	peeling nibi	W: MT
<i>Helosis cayennensis</i> (Sw.) Spreng.	<i>kwaikwi kwakiso</i>		W: MD
<i>Hibiscus sabdariffa</i> L.*	<i>sariri</i>	sorrel / hibiscus	L: FO
<i>Hymenaea courbaril</i> L.	<i>nachi</i>	West Indian locust	W: FO FU MD
<i>Ipomoea batatas</i> (L.) Lam.	<i>afi</i>	sweet potato	C: FO
<i>Ischnosiphon longiflorus</i> K.Schum.	<i>naki orokoda</i>		W: MD
<i>Lagenaria siceraria</i> (Molina) Standl.	<i>wa'iri, golie</i> (†)	calabash / bottle gourd	L: MT
<i>Manihot esculenta</i> Crantz 'Sweet'	<i>makashira</i>	cassava	C: FO
<i>Mauritia flexuosa</i> L.f.	<i>chibi</i>	ité palm	W: FO IF MT
<i>Nicotiana tabacum</i> L.	<i>soma, tuma</i> (†)	tobacco	L: SU MD
<i>Parkia</i> sp.	<i>fwa kana</i>		W: MT
<i>Protium</i> sp. 2	<i>bawawa</i>	kurokai	W: FO AF

TABLE 1 Plant names, their botanical classification, and uses (*cont.*)

Scientific name	Taruma name	Guyanese English name	Uses
<i>Schnella</i> sp.	<i>jini toro</i>		W: MD MT
<i>Solanum subinerme</i> Jacq.	<i>kobichi</i>		C: MD
<i>Tephrosia sinapou</i> (Buchoz) A.Chev., <i>Paullinia</i> sp.	<i>hayari</i>	root poison	W: MD FP
<i>Nephrolepis</i> spp.	<i>mo ajowa</i>		W: MD

Cultivation: crops (c), low-maintenance domesticates (L), wild plants (w). Uses: AF animal food, FO food, FU fuel, IF invertebrate food, MT material, MD medicine, SU social use, FP fish poison. Variants: synonyms (≈), historic names (†). Plants introduced in post-Columbian times are marked with an *.

TABLE 2 Plant names per number of contact events, dispersal, and morphological complexity.

Number of contact events per name	Dispersal	Simplex	Complex	Total
Shared with 0 languages	Unique	27 (46%)	0	27 (46%)
Shared with 1–3 languages	Local	2 (4%)	14 (24%)	16 (28%)
Borrowed and shared with 1–3 languages	Local	7 (12%)	0	7 (12%)
Borrowed and shared with < 3 languages	Wanderwort	8 (14%)	0	8 (14%)
Total		44 (76%)	14 (24%)	58 (100%)

3.1 Unique Plant Names

The unique names offer us a glimpse of the Taruma lifestyle. The Taruma people are long familiar with crops such as *choka* ‘maize’, *jitoka* ‘sugarcane’, *korona* ‘taro’, and *nito* ‘bitter cassava’. They enjoy the fruits of *piroka* ‘banana’, *makika* ‘cashew’, *makwe* ‘wild cashew’, *nado* ‘pepper’, *shirika* ‘whitee’ (*Inga* spp.), and *pichivi* (*Byrsonyma coccolobifolia*). They use palms such as *chada* ‘kokerite’ (*Attalea maripa*), *chamani* ‘turu’ (*Oenocarpus bacaba*), and *hoga* ‘kumu’ (*Onocarpus bataua*) as sources of food and building materials. They make mortars from *birijanako* (*Curatella americana*), arrows from *koba* reed (*Gynerium sagittatum*), and twine from *suja* (cotton) and *nakipa* ‘karawa’ (Bromeliaceae).

sp.). They make umbrellas and temporary shelters from *peritono* ‘wild banana’ (*Phenakospermum guyannense*), and still remember clothes made from *mêhe* ‘Brazil nut’ (Lecythidaceae sp.) bark, and sunscreen, dye, and insect repellent from *horia* ‘annatto’ (*Bixa orellana*). They burn the resinous wood of *dzu’i* (*Protium* sp.) to protect themselves from mosquitos and evil spirits. They used needles made from the spiny palm *kirafo* ‘pimpler’ (*Astrocaryum* sp.), and containers from *bikiro* ‘balata’ (*Manilkara bidentata*). Basketry is plaited using *dakika* ‘mokro’ (*Ischnosiphon arouma*) and *chokapa* (*Thoracocarpus bissectus*).

Importantly, the lack of a unique name does not mean that the speakers did not know a plant. The Taruma people exchanged knowledge about plants with other nations, which can lead to borrowing words. *Chiwi*, the name of the hyperdominant moriche palm (*Mauritia flexuosa*), which they must have known for a long time, is a borrowing, for example. On the other hand, some names classified as unique may ultimately prove to be loans. *Nito* ‘bitter cassava’, for example, may be an old Arawakan loan (cf. Proto-Arawakan *kanit^hi, Payne 1991: 397). Finally, some words may be borrowings from Taruma into other languages, since true cognancy can only be determined by the comparative method, which is beyond the scope of this paper.

3.2 Shared and Borrowed Plant Names

Shared and borrowed plant names are listed in Table 3 (simplex names) and Table 4 (complex names).¹ We list one language with a matching name per language family; the example comes from the first language listed. Below, we locate the shared words in time and space. We first give background information about the sociolinguistic context of the three main periods in Taruma history, and present the evidence for the proposed etymologies that supports the calculated loan rate and allow us to locate the exchanges in time and space. We kept the discussion of contact patterns in material culture, much of which is plant-based, for another occasion, but included in the discussion a few plant-based products that speak to the interactions on the Amazona and the Negro (Fig. 4).

1 Languages: AK Akawaio, BA Bahuana, BN Baniva, BP Brazilian Portuguese, GE Guyanese English, IC Island Carib, KR Karina, LK Lokono, MK Macushi, MW Mawayana, NH Nheengatu, PI Piaroa, PM Pemón, PN Puinave, SI Sikuani, SP Spanish, SR Sranantongo, WJ Wajãpi, WP Wapichan, WR Warao, WW Waiwai, YO Yoruba, YA Yanomami.



FIGURE 4
 Examples of plant-based products: water bottles (*Lagenaria siceraria*), container (*Attalea maripa*) for cassava tubers, cups (*Crescentia cujete*), bowl (*Manilkara bidentata*), basket for carrying cassava (*Thoracocarps bissectus*), basket for carrying game (*Oenocarpus bacaba*), ax handle (*Aspidosperma* sp.), cassava squeezer (*Ischnosiphon arouma*), fire fan (*Astrocaryum aculeatum*)

TABLE 3 Shared and borrowed (in bold) plant names

Taruma name	Scientific name	Shared with	Example	Spread
<i>makashira</i>	<i>Manihot esculenta</i>	WP, NH, BP, MK	<i>makashira</i>	Wanderwort
<i>papa, mapaya</i> (≈)	<i>Carica papaya</i>	WP, GE, WW, NH	<i>ma'apai</i>	Wanderwort
<i>karowa</i>	<i>Dioscorea trifida</i>	MW, BP, NH, MK	<i>kalua</i>	Wanderwort
<i>chivi</i>	<i>Mauritia flexuosa</i>	BA, PN, GE, YA	<i>itiwi</i>	Wanderwort
<i>yama, awayáma</i> (†)	<i>Cucurbita</i> sp.	WW, SP, WP, PN	<i>awayáma</i>	Wanderwort
<i>golie</i> (†)	<i>Lagenaria siceraria</i>	MW, SR, YO, KR	<i>kawalie</i>	Wanderwort
<i>koya</i>	<i>Crescentia cujete</i>	BP, NH, BN, PI	<i>cuía</i>	Wanderwort
<i>hayari</i>	<i>Tephrosia sinapou</i> , <i>Paullinia</i> sp.	GE, WP, AK, WR	<i>hayari</i>	Wanderwort
<i>watare</i> (†)	<i>Couratari guianensis</i>	LK, GE, KR, WJ	<i>wadara</i>	Wanderwort
<i>afi</i>	<i>Ipomoea batatas</i>	WW, SR, WR, IC	<i>napi</i>	Wanderwort
<i>kobichi</i>	<i>Solanum subinerme</i>	WP, NH, BP	<i>kobute</i>	Local
<i>soma, tuma</i> (†)	<i>Nicotiana tabacum</i>	WP, SI	<i>soom</i>	Local
<i>wabo</i>	<i>Euterpe oleracea</i> , <i>E. precatória</i>	WP, WW	<i>wabo</i>	Local
<i>pirisha</i>	<i>Dioscorea alata</i>	PM, WP	<i>pirisia</i>	Local
<i>bawawa</i>	<i>Protium</i> sp.	WP, LK	<i>bawawa</i>	Local
<i>sariri</i>	<i>Hibiscus sabdariffa</i>	GE, WP	<i>sarel</i>	Local
<i>molu</i> (†)	<i>Gossypium hirsutum</i>	WW	<i>mauri</i>	Local
<i>kobara</i>	<i>Ananas comosus</i>	PM	<i>kajuwara</i>	Local

TABLE 3 Shared and borrowed (in bold) plant names (*cont.*)

Taruma name	Scientific name	Shared with	Example	Spread
<i>nachi</i>	<i>Hymenaea courbaril</i>	WP	<i>natu</i>	Local
<i>wa'iri</i>	<i>Lagenaria siceraria</i>	WW	<i>wiria</i>	Local
<i>bīwa</i>	<i>Heteropsis flexuosa</i>	BA	<i>biwa</i>	Local
<i>ta(ka)</i>	<i>Astrocaryum aculeatum</i>	BA	<i>dakaxi</i>	Local

Synchronic variants are marked with (≈), historic form with (†).

TABLE 4 Complex shared plant names

Taruma name	Meaning	Scientific name	Shared with	Spread
<i>mo ajowa</i>	red howler's tail	<i>Nephrolepis</i> spp.	WP, KR, WR	Local
<i>kwakipa</i>	derived from <i>kwaki</i> 'to fish'	<i>Duguetia</i> sp.	WP, NH, WW	Local
<i>jini toro</i>	yellow footed tortoise's ladder	<i>Schnella</i> sp.	WP, KR	Local
<i>hohoki adu</i>	black curassow's crown	<i>Adiantum argutum</i>	WP, WW	Local
<i>soma o</i>	tobacco tree	<i>Couratari guianensis</i>	WP, MK	Local
<i>mo i</i>	red howler monkey fur	<i>Gossypium hirsutum</i>	WP, MK	Local
<i>badu chinari</i>	ax handle	<i>Aspidosperma</i> sp.	WP	Local
<i>charaba ada</i>	small river turtle's head	<i>Goepertia</i> sp.	WW	Local
<i>hakori jiriro</i>	dead man's stick	<i>Costus spiralis</i>	WP	Local
<i>hichi asukijo</i>	brocket deer's ear	<i>Byrsonoma verbascifolia</i>	WP	Local
<i>kwaikei kwakiso</i>	labba's sifted cassava	<i>Helosis cayennensis</i>	MK	Local
<i>naki orokoda</i>	trumpeter's knee	<i>Ischnosiphon longiflorus</i>	WP	Local
<i>choka kana</i>	corn's pattern	<i>Caladium bicolor</i>	WP	Local
<i>jasu asikijo</i>	fish ear	Unidentified tree	WP	Local
<i>fwa kana</i>	fire pattern	<i>Parkia</i> sp.	WP	Local
<i>piroka joka</i>	banana leaf	<i>Phenakospermum guyanense</i>	WP	Local

3.2.1 Knowledge Exchanges on the Amazon and Negro Rivers until the 18th Century

Until the 18th century, a nation called Taruma lived at the confluence of the Negro and Amazon rivers (Fritz, 1691; Edmundson, 1922: 73–74). West and east of the Taruma people lived the speakers of Arawakan languages: Manao,

Arauakí, Bahuana, and further upstream on the Amazon the Yurimaguas, speakers of the Tupian language Omagua (as evident from the name of their easternmost village, *Arabanate*, composed of Omagua *arawana*, a species of fish and locative *-te*, O'Hagan pers. comm.). Nheengatu, a Tupian language that influenced Brazilian Portuguese, was the official language of Portuguese Amazonia since 1686, and was widely spoken in the region in colonial times (Moore et al., 1994). Cariban groups that formed the Waimiri-Atroari nation lived to the north (Milliken, 1992). Three plant names speak to contacts with these nations, supporting the theory that the Taruma homeland was indeed located on the Amazona. The Taruma homeland on the Amazon is also supported by names of three plant-based products, including those shared with an Arawakan language of the Amazon Delta and a Tupian language of the Upper Amazon, whose speakers migrated past the mouth of the Negro at some point in their histories. We discuss the evidence in detail below.

One of the plant species that is documented well in the comparative sample is the moriche palm (*Mauritia flexuosa*), a plant that is also easy to identify. The Taruma name *chiwi* is shared with many Arawakan languages, including Bahuana *itiwi* on the Negro River, and Atorad *iwuza*, Mawayana *jiwi*, and Wapichan *dyuwuza* in Guyana, while the Tupian and Cariban languages of both regions have unrelated names. This makes it an Arawakan borrowing into Taruma. Crucially, Bahuana *itiwi*, pronounced [iciwi], is the most phonologically-sound match for *chiwi*. The main difference is the degree of palatalization of the first consonant, pronounced as [tɕ] in Taruma and as [c] in Bahuana.

Taruma *ta(ka)* (*Astrocaryum aculeatum*) is another word likely shared with Bahuana. While the Atorad name is unknown, no similar name exists in other languages of Guyana, many of which share the Wanderwort exemplified by Bahuana *watsi*. That said, in Bahuana, *Astrocaryum vulgare*, a botanically related palm, is called *dakaxi* (Ramirez, 1992: 117). The names appear to contain the same root: Taruma *taka* and Bahuana *daka*, which differ only in the voicing of the first consonant. We classify the names as shared, one of which changed the referent to a similar species. Interestingly, the exchange is echoed by the names of fans plaited from the shoots of such palms (see below).

The last plant name likely exchanged on the Amazon River is also shared with Bahuana. The case in point is Taruma *bīwa*, whose aerial roots are used to plait basketry (*Heteropsis flexuosa*). However, the exchange might have also involved a semantic shift. We do not know the name of the species in Atorad, but the Wapichan *tibi* and Mawayana *chebi* are not related. Neither is Bahuana *mamiri* (*Thoracocarpus bissectus*), a similar looking plant whose roots are also used in basketry, known under reflexes of the same root in Wapichan and Mawayana. That said, Bahuana also boasts *biwa*, which refers to an unknown

liana (glossed as “liane-manioc” in the source). We classify *bĩwa* as shared; the direction of this exchange is unknown.

Moving on to plant-based products, *cho'i* ‘cassava bread’ is shared with the languages spoken between the Negro and the Amazon rivers, including Arawakan Arauakí *tfũi* and Marawá *tfoöi*, and perhaps non-Arawakan languages: Kakuá *tfjʔ* and Yuhup *kooy*. Arauakí *tfũi* is the geographically closest source for the Taruma name. It is also phonologically similar: [o] and [u] are the same phoneme in Taruma (Serke, 2022: 31), while the glottal stop ⟨ʔ⟩, missing in the Arauakí name, is a sound that early explorers tended to miss (as did Farabee (1918) and Cary-Elwes (1920) when documenting Taruma). While the Mawayana name is unknown, languages of Guyana have different names for cassava bread. We classify Taruma *cho'i* as a borrowing from Arauakí *tfũi*.

Next, *komata* ‘cassava sieve’ has reflexes in Tupian languages, Cocama, Omagua, Nheengatu; and was perhaps coined by Omagua speakers, since the languages have several names for tools derived from verbs with the instrumental *-ta* (O’Hagan, 2011: 76). While the Atorad word is unknown, other languages have different names, mostly reflexes of a Wanderwort exemplified by Wapichan *manaru*. Crucially, while *cumata* appears in Nheengatu, it is used only in the variety of Nheengatu spoken on the Upper Negro River, and the Upper Negro variety of Portuguese (Ribeiro, 1985: 106). This implies that Taruma borrowed *komata* on the Amazon or the Negro River, as it could not have borrowed it from Portuguese spoken across the Guyanese border.

Last but not least, Taruma *maragwi*, the name of a fan used for fanning cooking fires and flipping cassava bread, is transparent in Taruma: it means ‘stingray’, since the shape of the fan resembles the fish (Fig. 6). This makes it a Taruma word borrowed by Aruan *malaj*, Atorad *marawi*, Bahuana *marawi*, Cocama *marawe*, and Paumarí *maravi*. Its spread can be best explained by past migrations. The ancestors of the Aruan, like all Arawakan peoples, are believed to hail from northwestern Amazonia, and to have migrated downriver in pre-colonial times to the Amazon Delta; while those of the Cocama are believed to originate further down the Amazon, and to have migrated up the Amazon (Lathrap, 1970). The mouth of the Negro River is the only place where they could have interacted with Taruma speakers. In this account, the Omagua spread *maragwi* further up the Amazon to the Paumarí, and Atorad borrowed it in Guyana.

3.2.2 Knowledge Exchanges in Guyana between the 18th and 20th Century

By 1725 a nation called Taruma appeared on the Essequibo River in British Guiana; the Xaruma, Saluma, and people named similarly were met soon on the

nearby Mapuera and Trombetas rivers (Boomert, 1977; Brown, 1877; Coudreau, 1887). Schomburgk (1843) met the Taruma people on the Kuyuwini, a tributary of the Essequibo, and reported that their population was less than 500. Languages spoken in the immediate vicinity included Waiwai to the south; Atorad, Wapichan, and Macuchi to the west; Trio and the Creole languages of the Maroons further east; and Mawayana to the southeast. The interactions with their speakers are reflected in words acquired from the languages of Guyana that could not have been borrowed on the Amazon or Negro rivers, but at the same time were already used by the Taruma at the beginning of the 20th century.

The first example is the name for tobacco: Farabee (1918) listed *tuma*, which has reflexes in many Arawakan languages and reconstructs to Proto-Arawakan (Payne, 1991: 422). As such, it is a borrowing into Taruma. Manao *aili*, Bahuana *cibeRu*, and Aruakí *libafada* on the Negro and the Amazon rivers, while also likely Arawakan roots (cf. Anauyá *siero*, Iñapari *hairí*, Asháninka *potfaro*, respectively, Michael et al., 2023), suggest it unlikely that the languages also inherited *tuma* that Taruma could have borrowed. Aruakí *pítumatfe* is a borrowing from a Tupian source (cf. Nheengatu *pityma*). In Guyana, on the other hand, reflexes of the word are found in Atorad *chooma*, Wapichan *sooma*, and Mawayana *tuma*, the most parsimonious source.

The second example is *awayáma* ‘pumpkin’ (*Cucurbita* sp.), documented by Cary-Elwes (1922). The name is shared with many Cariban languages, including Waiwai, and is therefore likely of Cariban origin, though it was also borrowed by other languages, including Wapichan. Waiwai *awayáma* is the most parsimonious source of the name, though we note that the name for the species is not known in Aruakí on the Negro River. The modern Taruma name for the species, *yama*, is not treated as a second instance of borrowing of the name of the species, since there is no language in Guyana that shortened its equivalent to a similar form, and there is thus no parsimonious source for *yama*. *Yama* is likely a language-internal development from *awayáma*.

Finally, *golie* (*Lagenaria siceraria*), listed by Farabee (1918) is ultimately a loan from Africa, via the Creole languages spoken by Maroon people, contact with whom would have been unlikely at the mouth of the Negro River. Several Surinamese Creole languages have similar names for this gourd, including Saramacan *golu* and Aucans *goo*, all of which go back to languages of West Africa (Van Andel et al., 2014; Shanks et al., 2000: 77). Taruma *golie* might have referred to the gourds for carrying water made from this vine, as it does among the Aucan people, a Maroon nation that traded with the Saluma. This semantic shift, however, does not take away from the contact scenario that *golie* speaks to.

When it comes to plant-based tools, it is worthwhile to return to Taruma *maragwi* ‘fan’. The Trio and Akurio name for a fan plaited with a virtually identical technique from *Astrocaryum murumuru* is *xipari* and *ipari*, respectively (Goeje, 1946: 272; Frikel, 1973: 135–136). While the two names are not loans, not only do both mean ‘stingray’, but they are also the only other cases of naming such fans, all produced with a similar technique, after the fish, even though this model of a fan is made throughout the region. The non-trivial observation about the fan’s shape and its consequent naming are another example of exchanges between the Taruma and the people of Suriname. Taruma is likely the source of the inspiration, since *maragwi* is transparent in Taruma and must have been used by the Taruma before the 18th century (as explained in section 3.2.1).

3.2.3 Knowledge Exchanges in Guyana since the 20th Century

The 20th century saw the disappearance of Taruma villages as a result of the epidemics of the 19th century and interethnic conflicts. Their residents joined the neighboring nations (Schmidt, 1942; Guppy, 1958; Fock, 1963). In the 1920s, when Cary-Elwes visited the last Taruma villages, he noted that there were still no Taruma people who could speak Waiwai, and only a few Taruma living at the edge of the Wapichan country could speak Wapichan (Butt Collson, 1982: 247, 252). He likely meant the Taruma at *Baidanaawa* ‘Duckling Hill’, mentioned by Roth (1929: ix), an unidentified site near Karaodaznaawa, an Atorad and Wapichan village (Fig. 1). This is also where Irene and Vincent’s memories of their family begin. Their parents lived around the same time at *Owaonaawa* ‘Monkey Hill’, an unidentified location near Karaodaznaawa. Their mother, Minglina, was from a Taruma village on *Chamani Kijo* ‘Turu River’, an unidentified tributary of the Kuyuwini River, which her family left due to the conflicts with the Waiwai. Their father Louis, was an Atorad man from Brazil. They moved later to the forest near Maroranaawa, where Irene and Vincent were born. When their father moved back to Karaodaznaawa, the chief of Maroranaawa brought the rest of the family into the village. The last part of Taruma history is echoed by intensive localized language contact.

The current name for tobacco is an example of recent localized influence. While Farabee (1918) listed *tuma*, a Mawayana loan, we recorded *soma*, which is a phonological adaptation of *tuma* under the influence of Wapichan *sooma*. In sum, Taruma borrowed the word for tobacco twice, though the second time involve merely a sound change. Another name borrowed twice is that of papaya: Taruma *mapaya* is a borrowing that cannot be located in time and space, but *papa*, documented alongside *mapaya*, is a borrowing from Guyanese English *pawpaw*.

Influences of Guyanese languages include *sariri* 'sorrel' (*Hibiscus sabdariffa*), a plant introduced relatively recently, borrowed from English sorrel, likely via Wapichan *sarel*. More surprisingly (to the off-site team), the same applies to makashira 'sweet cassava' (*Manihot esculenta*). The name comes from Cariban languages, in which it is transparent (cf. *amaka* 'sweet' in Eñepa and *sheere* 'cassava' in Waiwai; Epps et al., 2023), and appears in many languages. There is evidence, however, that sweet cassava was introduced in this part of Guyana recently. The Waiwai and the Trio have grown it only since the 1950s (Frikel, 1973: 50; Yde, 1965: 29). According to Irene and Vincent, the Taruma speakers, the Taruma people did not plant sweet manioc either; their parents were introduced to it by the Wapichan.

Calques coined by bilingual speakers provide further evidence of intensive localized contact. That some calques are recent is implied by the existence of unique names for the same plant. Taruma *piroka joka* 'banana leaf' (*Phenakospermum guyannense*) mimics Wapichan *suuzu anaba*, and exists alongside *peritono*, a unique name pronounced variously in our recordings, suggesting that the speakers had trouble remembering it. The latter name was, however, also recorded by Cary-Elwes at the beginning of the 20th century. The new calques also include *jasu asukijo* 'ear of a certain fish', a calque of Wapichan *soiriki tain*, also known in Taruma as *kiyaku*, a unique name.

The last example is *soma o* 'tobacco tree' and Wapichan *sooma mada* 'tobacco skin' for *Couratari guianensis*, a tree whose papery bark is used to roll tobacco into cigarettes. While the name could be a name developed independently (especially since the bark of trees from the *Lecythidaceae* family is used to wrap tobacco across Amazonia; Wilbert, 1987), there is evidence that it is a recent calque. Cary-Elwes listed Taruma *watare* for Wapichan *sooma mada*. While *watare* is itself a Wanderwort, the important point is that Taruma used to have a different name for the species just a century ago.

3.2.4 Borrowings That Cannot Be Located in Time and Space

Several loans cannot be located in time and space. Some words were so widely borrowed that they appear in both regions, and in some cases, we cannot even tell in which language family they originate. The Wanderwort *mapaya* 'papaya', shared with many languages in South America, is a good example. Others such as *pirisha* 'long yam' (*Dioscorea alata*), are shared with several languages, but are not documented for the languages of the Amazon and the Negro rivers.

A more complicated case is *hayari*, a Wanderwort for *Tephrosia sinapou* and *Paullinia* sp. used to catch fish. While the Wapichan call it *aya*, they also know it as *hayari*. Today, *hayari* is also used by the coastal Lokono (*Lonchocarpus* sp.), whose language is the source of Guyanese English *hayari* for plants

used to catch fish in general (Patte, 2011: 92). It is unclear whether *hayari* is an old Taruma word that changed referents, a word borrowed into Taruma and Wapichan from Lokono or Guyanese English (e.g., through (long-distance) trade).

The language family of several more names can be determined. Taruma *karowa* ‘bell yam’ (*Dioscorea trifida*) and *koya* ‘calabash tree’ (*Crescentia cujete*), for example, reconstruct in the Tupian language family (Mello, 2000: 171, 173), and exemplify Tupian loans. While both appear in Omagua and Nheengatu, for example, Nheengatu *kara* and *koya* were also borrowed by Brazilian Portuguese. Consequently, they could have been borrowed by Taruma from Portuguese on the Negro River or in Guyana through contacts with the Brazilian population. Moreover, reflexes of *karowa* are also found in other Indigenous languages of Guyana.

Cariban loans include Taruma *afi* ‘sweet potato’ and *molu* ‘cotton’, which reconstruct in the Proto-Cariban language family (Girard, 1971: 280, 291). We find the reflexes of *afi* in, for example, Trio *napi*, but also in Waimiri-Atroari *nepy* on the Negro River for *Dioscorea trifida*. Taruma *molu*, recorded by Farabee (1918) alongside unique *suja* recorded by Cary-Elwes (1922), has reflexes in, for example, Waiwai *maurĩ*, but the name for the species is poorly documented on the Negro River.

Poor documentation also prevents us from locating the borrowing of *wabo* ‘turu’ (*Euterpe oleracea* and *E. precatória*), *kobara* ‘pineapple’ (*Ananas comosus*), and *wa’iri* ‘bottle gourd’ (*Lagenaria siceraria*), all found mostly in Cariban languages. The name for the bottle gourd is even transparent in Pemón: *wayirü* is the possessed form of *wai* (García Ferrer, 2008: 60, 198).

Likely Arawakan loans include *bawawa* (*Protium sp.*), shared with Wapichan *bawawo* and Lokono *ibajawa* (Outer, 2001: 89), *kobichi* (*Solanum subinerme*), shared with Wapichan *kobute*, but also Baré *kubiju*, in which it refers to *Solanum sessiliflorum*; *nachi* (*Hymenaea courbaril*), shared with Wapichan *natu* and several Arawakan languages (Ramirez, 2020: 14). Crucially, if the last words had been borrowed from Wapichan, they must have been borrowed before the 20th century, since by then the palatalization of /t/ in Taruma was complete. Thereafter, there is reason for /t/ to become /tɕ/, as is the case with Wapichan *ati* ‘until’, borrowed recently by Taruma as *ati*. In other words, the borrowings are not recent loans resulting from bilingualism in Wapichan.

We also included here the calques, for which there is no evidence that a unique name existed before, and which are not recorded for the languages of the Negro and the Amazon rivers (and therefore cannot be compared). Taruma *jini toro* ‘yellow footed tortoise’s ladder’, a *Schnella* species with medicinal properties, has equivalents in Wapichan, Lokono, and Kali’na (Patte, 2011:

94) and Surinamese Creole languages (van Andel and Ruyschaert, 2011). Similarly, Taruma *mo ajowa* ‘red howler monkey’s tail’ (*Nephrolepis* sp.), named so because the red scales of the rhizome of this fern resemble the monkey’s tail used as a remedy for whooping cough, has equivalents in Wapichan, Lokono, Kari’na, and Warao for ferns with the same uses, embedded in oral traditions about howlers (Rybka, 2020). Another calque that brings up the howler is *mo i* ‘howler’s hair’, the brown cultivar of cotton, found also in Wapichan and Makushi.

Most calqued names are shared with Wapichan; except *charaba ada* ‘water turtle’s head’ (*Goeppertia* sp.) and *kwaikwi kwakiso* ‘labba’s sifted cassava’ (*Helosis cayennensis*), which have equivalents in Waiwai and Makushi, respectively. Consequently, one may be tempted to see them as calques coined in Guyana, but that would be a hasty decision. Taruma *kwakwipa*, *Duguetia* sp. used to make fishing rods is derived from the verb *kwaki* ‘fish’, and means both ‘fish-hook’ and ‘fishing rod’. The Wapichan call it *kobau taba’u*, where *kobau* is ‘fishing rod’ (derived from *kobaw* ‘fishhook’) and *taba’u* ‘leg’. The Waiwai have a similar name, and all three make fishing rods from its stems. However, making fishing rods from the strong and flexible treelets of *Duguetia* species is a common practice in Amazonia (van Andel, 2000). Nheengatu, a language of the Negro River, for example, also has a species of *Duguetia* named similarly: *pindaiwa mirá*, with *pindaiwa* ‘fishing rod’ (cf. *pinda* ‘fishhook’) and *mirá* ‘tree’. In sum, some calques may be widespread, and some might have been independent inventions.

4 Discussion

The analysis produced three main findings. First, while Irene and Vincent’s memories of the Taruma people start with their grandmother, and the speakers have never heard about Taruma people migrating from the south, loan words offer linguistic support for the migration from south to north. The evidence is limited in quantity, but it is strong due to the strict criteria applied in the etymological analysis: *chiwi* ‘morange palm’, *cho’i* ‘cassava bread’, and *komata* ‘cassava sieve’ have matches only in the languages of the Amazon area. The findings align with the anecdotal archaeological evidence (Boomert, 1977), the use of the exonym *Taruma* on the Amazon and in Guyana (Rivière, 1967), and the origin story told by the Taruma a century ago (Farabee, 1918). Further splits occurred after the migration. The more robust evidence of the similarities between the pottery from the Taruma lands in Guyana and that from a dozen settlement sites in Suriname suggests that the Taruma people dispersed as far

northeast as the Sipaliwini River, and that they were not temporary migrants (Boomert, 1977). Historical evidence suggests that these people were called Saluma in the 19th century by the Trio and the Maroons, but by the time Saluma wordlists were collected they shifted to Trio (Carlin, 2004). The histories of *golie* ‘gourd’, a loan from Creole languages, and *maragwi* ‘fan’, a Taruma word that inspired Trio and Akurio names of fans, support the claims that the nations of Suriname were in contact with the Taruma people.

Second, despite a history of displacement, the Taruma preserved 46% of their native plant lexicon; much of the rest was borrowed or calqued. The interpretation of the latter category of loans depends on our positionality. Some may see calquing as part and parcel of language loss, though those striving to keep their languages alive may see it as means to regrow the vocabulary of their language. Vocabulary can only be expanded by borrowing or coining words; calquing is a process of coining words inspired by those in other languages. Our remote workflow allowed the speakers and learners to record plants they chose, removing from the picture the outsider asking questions, which could dispirit them by pointing to the gaps in their knowledge, or pressure them to invent names. It is our contention, however, that the speakers and learners of endangered languages, Taruma in particular, should not shy away from calquing, especially if they calque words from Indigenous languages. The discussed plant names illustrate vividly that calques carry over, and make explicit, non-trivial observations about plants, their features, and uses. They carry knowledge, and as such are a viable means of passing knowledge from one generation to another, especially under the conditions of language loss.

Finally, Taruma borrowing rate (26%) is high, despite the poor documentation of the languages of the Amazon region, which is expected to lower the rate. Bowerman et al. (2014: 206) showed that South American languages borrow on average 5% of their flora and fauna terms, which is less than those in North America and Australia. The observed disparity between the Taruma rate and the norm does not seem to reflect differences in sampling. Bowerman et al. (2014: 206) detected no significant difference between flora and fauna, which means that our focus on plants should not skew the results. Their sample was “balanced among orders and taxa within each area, and were sampled for a range of sizes, functions, cultivation status, and salience,” but limited by the availability of forms in the languages required for the global comparative study (Bowerman et al., 2014: 202). We did not impose an etic structure on our sample but our sample covers a number of the same plants as those studied by Bowerman et al. (2014) and is 2 times larger. And since the data collection was led by the Taruma speakers, the sample reflects their current interactions with the environment.

In what follows we discuss the possible explanation of the unusually high borrowing rate in Taruma.

4.1 *Migration, Diaspora, or Location?*

The Taruma migration increased the number of ties that the speakers had with different nations over the last three centuries, which could elevate the loan rate. The evidence of that is limited, however. While some words were borrowed in Guyana, there are also cases of the replacement of old loans by new loans, phonological readaptation of old loans, and the reborrowing of loans. While such adaptation is facilitated by formal similarities in some cases and only synchronic forms are counted towards the loan rate, the examples show that some plant names may be more prone to borrowing than others. Consequently, changing location might not necessarily increase the loan rate. Crucially, almost half of the loans are not just loans, they are wanderwörter, words that are particularly prone to borrowing, and indeed some of them were borrowed twice by Taruma. The data even include examples of wanderwörter for wild plants, which fall outside the scope of typical wanderwörter, that is, domesticated crops (Haynie et al., 2014: 11).

Moreover, in South America, many nations have recent and old histories of migration, so we could expect their effects to be accounted for in the global loan rate. In the case of languages that belong to language families, however, migration may lead the diaspora splitting off from a common ancestor to be more conservative and resilient to loans. Carijona, for example, estimated to have split off from its sister languages between 500 to 900 years ago (Meira, 2000: 160), conforms to the general rate, suggesting that migration had little effect. Such effects should diminish with time, however. On the far end of the cline, we expect to find speakers of language isolates, who split off from their ancestors so long ago that their languages are not attested. Comparing Taruma to languages displaced more recently, especially other isolates, could help evaluate the role of the diaspora effect in the future. As it is, the global loan rate (9.8%) is based on 124 languages that have relatives and only six isolates, two South American (Bowerman et al., 2014: 200), which prevents us from exploring this factor further. We note, however, that Hodi, another isolate, has the highest rate on the continent (14%).

The migration also means that we may need to refocus the discussion on a different landscape. The Taruma lived once at the center of the longest river system on the continent, which could lead to accumulating knowledge from its different corners that the Amazon and the Negro rivers connected them to. The role of these corridors in shaping the vocabulary of its peoples shows in *maragwi* 'fan', which almost reached a wanderwort status, as well as

cho'i 'cassava bread' and *komata* 'cassava sifter', all dispersed along the Amazon basin. Material culture offers additional examples: Roth (1924: 275) categorized Taruma bench design together with those of the Upper Negro River, not those of Guyana. While Haynie and colleagues (2014: 10) found that wanderwörter "tend to originate with languages that are located along the larger rivers and move into the upland regions", we note that all above examples are plant-based products that are excluded from the loan rate. All in all, there is no evidence that the Amazon watershed contributed to the loan rate in flora vocabulary, though there are plant-based products that are dispersed along the Amazon.

4.2 *Different Plants or Different Mode of Interacting with Them?*

It may be expected that the different landscape the Taruma entered in Guyana afforded new plants or new uses, which triggered borrowing. The evidence of that is scant, however, since there are no plants endemic to Guyana in the sample, and the names of the crops introduced in colonial times include both loans and unique names. The data are particularly surprising since cultivated plants tend to be less likely borrowed and more likely to be unique or inherited (Bowern et al., 2014: 212). In Taruma, cultivated plants are just as often borrowed (50%) as unique (46%). The same pattern emerges for crops (54% loans, 42% unique), relatively low-maintenance plants (46% loans, 38% unique), and food crops only (54% loans, 45% unique). In sum, cultivated species show a strong footprint of contact. Wild plants, on the other hand, tend to be unique (12% loans, 50% unique). The names of cultivated plants are thus more innovative than wild plants, which suggests the Taruma might have lived a life more focused on wild plants in the past. This aligns with the tendency for hunter-gatherers to have higher loan rates than agriculturalists (notably, hunter-gatherers Hodi (16%) and Sikuaní (14%) top the ranking of loan words in fauna and flora terms in South America, Bowern et al., 2014: 205).

There is ethnographic, archaeological, and ethnohistorical evidence that the Taruma people were indeed more mobile in the past than they are today and relied more on fishing and gathering than on agriculture. The Schomburgk brothers mentioned only being able to procure bananas, sugarcane, pineapples, and passionfruit from the Taruma, and that they did not grow much cotton and made their hammocks from the moriche palm fiber (Schomburgk, 1845: 36, 42, 54; Roth, 1922, II: 371). Ogilvie (1913: 98–99) wrote that the Taruma "lived almost exclusively of fish" and did little hunting, despite their lands carrying "more [tapir] to square mile than any district". Farabee (1918: 136) repeated Ogilvie's points and added that they "pay less attention to growing vegetables

[than the other nations]”. He noted that they “have fields of cassava and plant a little corn [...], but they have no beans, melons, or pumpkins”. At one village, he saw a field devoted to cassava, with a few bananas, papayas, cashews, sugarcane, sweet potatoes, and yams scattered about (Meggers and Evans, 1960: 243). Archaeological evidence shows that their villages were occupied for a relatively short time, and that several sites might have been occupied more than once (Meggers and Evans, 1960: 245–246), which suggests they were more mobile in the past.

The Taruma oral history echoes a part of this description. According to a fragment from the Taruma origin story reported by Farabee (1918: 147–148), the Taruma did not know how to make fields in the past. However, two twin brothers, Taruma culture heroes, fished many things out of a deep pond, including the first woman. Her father was a giant anaconda, an animal sacred to the Taruma, which they never hurt and enjoyed keeping around their villages. The giant anaconda was the source of all the seeds that the Taruma then began to plant. The story suggests a time in the past without agriculture, which was introduced through marriage by outsiders. Today, the Taruma still prefer fishing to hunting, and practice small-scale agriculture: Irene and Vincent do fish, but rarely hunt, and they only learned to make cassava products (e.g., alcoholic drinks) among the Wapichan. The speakers also remember their ancestors as a mobile nation with more temporary settlements. Moreover, bitter cassava, the staple crop of Amazonian agriculturalists might be an Arawakan loan, and sweet cassava is a recent loan. In sum, the data suggest that the Taruma people might have relied more on fishing and gathering in the past. What is unclear is how ancient the focus on fishing and gathering is. Was it already practiced on the Amazon or is it the result of displacement, which required falling back on more flexible, mobile subsistence strategies?

4.3 *Intermediaries in Local Trade*

While the reasons behind borrowing the names of cultivated plants remain unclear, trade may explain how they entered the language. The Taruma people likely complemented their subsistence activities with trade with other nations, from whom crop names were borrowed. Examples of such foraging-farming symbiosis, with similar linguistic repercussions, abound in the literature (Epps, 2020), and trade seems to have played a key role in Taruma history, starting already on the Amazon River. When the Dutch entered the area, the Taruma were the first to supply enslaved people to them, responding to market demand (though they were later enslaved themselves by the Portuguese; Love, 2011: 117). Ribeiro de Sampaio (1825: 208) even claimed that after 1720, the Taruma, together with the Portuguese, traded up the Branco River. While Rivière (1967:

302) warned that Ribeiro de Sampaio was making a case for Portuguese rights to the land, Fritz also noted the Taruma trade on the Branco (Edmundson, 1922: 73–74).

In Guyana, the Taruma were known to trade cassava graters from the Waiwai to the Atorad and Wapichan, so much so that the trails connected their villages (Roth, 1924: 633–636). They also traded balata resin and letterwood used in the manufacture of bows to the Wapichan and the Macushi, and European glass beads and hunting dogs to the Trio (Roth, 1924: 82, 153, 154). They also bartered dye made from *Fridericia chica*, apron belts, and sugarcane (Roth, 1922: 309, 313, 371). The Maroons of Suriname visited the Saluma for trade purposes as well (Duin, 2020: 130). Fock (1963: 237) went as far as to suggest that the Waiwai origin story, their agricultural system, and written sources all point to the Taruma's role in dispersing cultural salient plants to the Waiwai. The fact that Waiwai did not borrow words from Taruma as a result is in line with the tendency for words to be borrowed from agriculturalists by hunter-gatherers (Epps, 2020). More surprisingly, despite this trade, the Taruma did not accumulate many goods:

The Taruma, I found, had no special culture nor many industries worth speaking of. Most tribes specialize in some handicraft, the products of which they can exchange with other more fortunate tribes for the necessary knives, axes, or other hardware which the slowly percolating advance in outside standards of life and methods makes essential. True, the Taruma made a few graters once in a way, but they would appear for long to have been the intermediaries in tribal trade, and much of their time would be spent slowly traversing the long distances between their various customers with the temporary use of such knives, etc., as they were entrusted with as the reward of their labor. [...] They had a great reputation for hunting dogs, but I found that the tribe was almost a complete fish eating people.

OGILVIE, 1913: 97

According to Ogilvie, the Taruma people did not specialize in any trade goods (although later on, he noted that hayari, for example, grows abundantly in the Taruma lands and “is peculiar to the Taruma, and apparently unknown to the Wapichanas”). The Taruma also had no use for the articles that they were most known for, namely the hunting dogs, and they used the goods they acquired for sale before selling them (rather than acquiring such tools for themselves). All this suggests that trade was central to the Taruma social organization as a means of exchange, rather than accumulating, of goods. But while people trade objects made out of wild plants (e.g., baskets), which is reflected in loans

for plant-based products in Taruma, they rarely exchange wild plants or their seeds. By contrast, crop propagules (roots, cuttings, seeds), while themselves not *per se* objects of trade, are often exchanged between people, and thus more subject to language exchange than wild plants. It is thus likely that among the Taruma people the trade constituted the main channel for acquiring new crops, and at times their names with them.

5 Conclusions

In Amazonia, where archeological finds are limited due to the biodegradability of Indigenous material culture and written historical sources are scarce since most cultures are oral, linguistics offers an important window into the past. The linguistic means of exploring the past are limited in the case of language isolates, however, since we cannot use the comparative method to reconstruct cognates and proto-languages. In this case, loans are our only window into the past. They can be particularly informative when analyzed together with their referents and the knowledge associated with them. Despite the floristic diversity of Guyana, the problems we encountered with the remote identification of plants, and the poor documentation of the languages Taruma was in contact with, our findings offer informative roadways into the history of the speakers of the language isolate. The identified loans show that the Taruma people migrated from the Amazon River to modern-day Guyana, which correlates well with evidence of the migration emerging from archaeological finds, external historical accounts, and oral history. The unusually high rate of loans in Taruma plant vocabulary (26%), and their distribution among cultivated and wild plants, suggest that the Taruma people used to live a life more focused on gathering and fishing. The ethnographic record, Taruma oral history, and loans of plant-based products also suggest that the role of trade in their contacts with agriculturalists warrants further investigation. Further research should extend the analysis to material culture, fauna, and basic vocabulary to determine how loan patterns in flora vocabulary, and the conclusions drawn from them, fare against those in other domains of Taruma knowledge.

Supplementary Materials

The Supplementary Materials, which include Appendices 1, 2, and 3, can be found on Figshare, at: <https://doi.org/10.6084/m9.figshare.27850197>.

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